

International Conference on Business and Economics - Hellenic Open University

Vol 2, No 1 (2022)

ICBE-HOU Proceedings 2022



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doi: [10.12681/icbe-hou.5349](https://doi.org/10.12681/icbe-hou.5349)

To cite this article:

Kapotas, S. (2023). Digital transformation of organizations and their organizational cultures. A case study in a national defense industry. *International Conference on Business and Economics - Hellenic Open University*, 2(1).
<https://doi.org/10.12681/icbe-hou.5349>

Digital transformation of organizations and their organizational cultures. A case study in a national defense industry

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Abstract

Digital transformation has become vital for organizations in order for them to differentiate from competitors providing a competitive advantage in the fast-changing environment they operate. Digital transformation is considered as a radical transformation affecting organization's products, services, people and processes while improving performance. It is a risky and tremendous challenge for most organizations. Based on a dissertation with the current paper an approach on digital transformation, in a national defense company is attempted. Products and services provided are characterized through high quality standards and a strong culture. Those characteristics are considered a fruitful ground for providing a framework to transform an organization into a digital one. Taking into consideration the above, literature research on digital transformation of organizations and their benefits are provided. The digitalization process is analyzed in order to show the building blocks of transforming the organization into a digital one. However, in order to start such a process, the organization has to have an adaptive high performance organization culture. This is considered as the base to start the digitalization process. In order for the organization to have such a culture, current situation has to be assessed and certain actions to be taken. An assessment of above-mentioned company is presented and actions proposed. It is obvious that organizational digital transformation is inextricably linked with an organizational culture change. The benefits and barriers from such a transformation are shown and finally proposals presented regarding a digital strategy implementation as well as a vision and mission statement for the company.

EL Classifications: M14.

Key words: Digital transformation, digitalization process, digital strategy, organizational culture change, vision and mission statement

1 Introduction

A company intending to be transformed digitally can be considered as being in a pre-digital state. This consideration is mentioned for the case that some organizations or digital born ones are already in the digital state.

A digital organization should not be confused with a digital transformed organization. (e.g., that the digitalization of the organization has taken place).

Digital organizations are enhanced by the development and deployment of Information Systems (IS). Those systems are the combination of three key technologies:

- (i) virtualization systems like cloud computing,
- (ii) mobile systems like smart phones, tablets, internet of things, social media and
- (iii) built-in analysis systems, like big data.

If the above technologies are combined with back office Integrated Information Systems (ISS) such as enterprise systems, then digital organization can be developed and deployed. (Loonam, Eaves, Kumar, & Parry, 2018, p. 102).

Digital Transformation is a form of business transformation which is considered as a holistic form, supported by IS and accompanied by fundamental technological and economic changes at both industrial and organizational level (Besson & Rowe, 2012) as cited in (Chanias, Myers, & Hess, 2019, S. 17). It is defined as “the changes associated with the applications of digital technology in all aspects of human society” (Stolterman & Fors, 2004, p. 689) as cited in (Langer & Yorks, 2018, p. 179).

In order for digital transformation to take place the IS or Information Computer Technology (ICT) Systems to be used in an organization, are a prerequisite. Something like the backbone of the digitally transformed organization.

Digital transformation focuses on the potential for greater leverage of customer engagement. This capability will bring more flexibility to standardized and centralized business processes and will provide new opportunities in a strategic point of view, resulting in the restructuring of business model and the creation of new products and services. Many times, this will have a positive impact on creation and evolution of value chains and industries (Westerman & Bonnet, 2015) as cited in (Loonam, Eaves, Kumar, & Parry, 2018, p. 102). In addition, (Berman, 2012, p. 17) as cited in (Loonam, Eaves, Kumar, & Parry, 2018, p. 102) stated that in order “to succeed in digital transformation, leading companies focus on two complimentary activities; reshaping customer value propositions and transforming their operations using digital technologies for greater customer interaction and collaboration.”

Digital Transformation as a Process (DTP) by applying digital technology and capabilities to

do many of the things the organizations does regularly, but in new and better ways that drive improved outcomes. (OCI, n.d.)

(Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013), as cited in (Chanias, Myers, & Hess, 2019, p. 18) defines the **Digital (business) Strategy (DS)** as an “organizational strategy formulated and executed by leveraging digital resources to create differential value”. A **Digital Transformation Strategy (DTS)** will enable to the entire organization to develop and implement such a digital strategy (Hess, Matt, Benlian, & Wiesböck, 2016) as cited in (Chanias, Myers, & Hess, 2019, p. 18). Any former strategies are not necessarily replaced by a DTS; most likely they have to be aligned with them (Chanias, Myers, & Hess, 2019, p. 18).

2 Literature review

2.1 Importance and Major Benefits of digital organizations

Irrespective of the industry an organization needs to transform to survive in the evolving business environment. Without transformation, the risk of becoming irrelevant in today's fast changing landscape is high. Organizations face constant change, which puts new pressure on both organizations and employees.

Digital transformation has accelerated in organizations around the globe. The biggest obstacle most organizations face during digital transformation is cultural acceptance. Constantly changing objectives, lack of aligned key performance indicators and unclear vision definition are key obstacles to this transformation. (Services, 2022)

During digital transformation, system processes, workflow and company culture undergo changes. Digital Transformation changes the way an organization operates affecting each level of the organization. Those changes bring data across areas of each level of an organization to work together more effectively. (VIRTU, 2021)

As per (Sabbagh, El-Darwiche, Friedrich, & Singh, 2012), digitization has a proven impact on reducing unemployment, improving quality of life, and boosting citizens' access to public services and allows governments to operate with greater transparency and efficiency.

There are many benefits of digital transformation. Some major benefits identified are (Virtu, 2020):

Increased profits

Digital transformation improves efficiency and profitability. According to (Virtu, 2020), SAP reported that 80% of the companies that have completed digital transformation, have reported increased profits and 85% of them report that they have increased their market share. On an average, leaders expect 23% higher revenue growth than competitors.

Increased agility

Organizations become more agile when they are transformed digitally. They increase their flexibility to adopt Continuous Improvement (CI) strategies and improve speed-to-market. Organizations adapt and innovate faster and open the pathway for improvements.

Improved productivity

Workflow and productivity improvement are enhanced when the company uses the right tech tools that can work together. Team members work more efficiently when data have been integrated throughout the organization and many manual tasks have been automated.

2.2 Major Barriers to digital transformation for organizations

In contrary there are organizational barriers which hinder digital transformation. Some of those identified are (Gupta, 2018) as cited in (Mirković, Lukić, Lazarević, & Vojinović, 2019, p. 257):

Unclear digital transformation vision and objectives.

An unclear strategic vision and objectives, miscommunicates the correct aspiration of the management to the stakeholders (employees, customers, suppliers, shareholders etc.) and does not help direct company's personnel actions in a common direction.

Lack of understanding digital transformation.

Management should have the knowledge and the experience to understand the digital transformation.

Lack of digital leadership skills

Leadership skills like forward looking, understanding of technology, being open-minded and collaborative are prerequisites for the successful implementation of the DTP.

An organizational culture that is inflexible

Organizational culture shall be flexible to adapt to changes triggered by the DTP

Rewards and incentives are not aligned to digital transformation

If rewards and incentives do not align with any organizational change, then the transformation will be affected and rejected.

Employees' resistance to change

A resistance to change is a normal reaction from the employees, especially if they are not briefed on the reasons of the change and the thinking behind the decision to proceed to a change.

2.3 Management Functions Contribution to DTP, Quality Management (QM) & IT

Management

Key persons to lead the initiatives for DTP are by default the technology executives specifically IT leaders, because of the technical requirements for completing these projects. They have to

undergo a transformation as leaders by their own, in order to form the strategic goals and cope with the dynamic changes of consumer behavior. According to (Ponsignon, Kleinhans, & Bressolles, 2019) digitalization is a cross-functional project affecting all processes of the company and QM has a cross-functional task monitoring and correcting all company processes, being strongly stakeholder-focused and having a unique way of working and thinking in the organization. In addition, QM can provide methodical approaches to digitalization and a reference frame in order to manage projects with strong Exploitation and Exploration capabilities and has to conduct its own digital transformation, e.g., digitalizing its own Quality Management System (QMS)

2.4 Building blocks of digitalization process (DTP)

(Ponsignon, Kleinhans, & Bressolles, 2019), suggest a road map to conceptualize the digital transformation with the help of Quality Management (QM) consisting of four stages:

1.stage: Digital transformation planning

QM can provide guidance of the way the transformation can be conducted. A cross functional steering committee will be responsible of setting and driving the transformation to the different operational levels.

QM's role will be supportive, helping on decision making, assessing any anticipating potential impacts on operational, financial, social, human, safety and environmental aspects and define the method of implementing the digital transformation (Ponsignon, Kleinhans, & Bressolles, 2019, p. S27).

2.stage: Conducting the digital transformation (Ponsignon, Kleinhans, & Bressolles, 2019, p. S28)

In order to conduct the digital transformation QM function can:

- ✓ Provide coordination of the collective effort by organizing workshops and group assignments,
- ✓ stimulate employee engagement by helping, supporting and advising employees regarding the changes developing and implementing training mechanisms to increase employees' skills and knowledge regarding digital tools and techniques and
- ✓ enable structured agility in order to maintain control the way the processes are formalized allowing simultaneously flexibility and freedom in process execution.

3.stage: Digital transformation evaluation (Ponsignon, Kleinhans, & Bressolles, 2019, p. S28)

QM's ability to implement performance indicators and assessment scorecards plays a vital role of controlling and measuring the digital transformation success. Measuring the impact of the digitalization process using indicators like defects, efficiency, supplier and customer

satisfaction, digital solutions engagement etc. will give the opportunity to assess the advantages provided by this process. In addition, QM will be responsible to centralize and valorize all data gathered so none of them will be un-exploitable.

4.stage: *Digital transformation adjustment* (Ponsignon, Kleinhans, & Bressolles, 2019, p. S29)

This stage refers to the capitalization of any newly acquired knowledge. QM will be responsible to develop, feed and keep up-to-date the centralized knowledge base in terms of performance and excellence as well as share and spread a culture of continuous improvement across the organization. Figure 1 below, shows the road map as suggested by (Ponsignon, Kleinhans, & Bressolles, 2019)

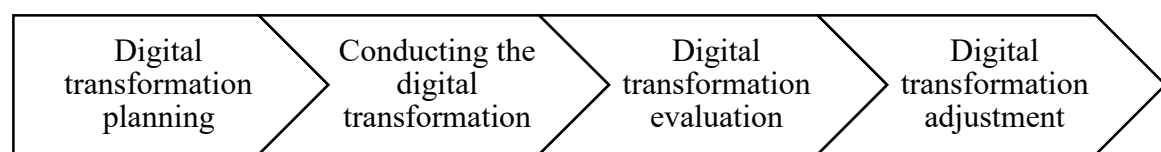


Figure 1 Road map to conceptualize digital transformation with the help of QM function

2.5 Organizational Culture and attitudes towards digitalization.

Organizational cultures have their own history, characteristics and existence (Michiotis, 2005, p. 20). Key elements of organizational culture like values, beliefs and practices originate from the founder and or strong leaders as well as from exemplary actions of company personnel. Those are being articulated from business principles, company policies, operating approaches and other. Over the time they take root, are being accepted by company managers and the employees and become integrated in the way the company does its business (Thompson, Gamble, Peteraf, & Strickland III, 2018, p. 350).

Core values and ethical principles are the foundation of company's organizational culture. (Thompson, Gamble, Peteraf, & Strickland III, 2018, pp. 350-351), identified two roles, necessary for building a culture process, namely:

1. Promote a climate of work where the personnel of the company can share common and strongly held convictions of the way the company's business is being conducted.
2. Guide the personnel of the company of how to do their jobs, doing the right things as well as the right way.

How strong or weak a company culture will evolve, depends of how deep and wide the core values and behavior norms regulate the way the company conduct its business. (Thompson, Gamble, Peteraf, & Strickland III, 2018, p. 353).

A strong culture which is synchronized with the chosen company strategy is embracing

attitudes, behaviors and work practices to support strategy execution and is considered a driver for a proficient strategy execution process and a healthy culture.

Healthy cultures exist in two types with following key characteristics: (Thompson, Gamble, Peteraf, & Strickland III, 2018, pp. 354-356):

1. High performance cultures
 - Strong sense of personnel involvement.
 - High loyalty and dedication on the part of employees.
 - Emphasis on individual initiative and effort.
 - A clear delineation of each organizational unit and individual with company's performance expectations.
 - Proactive approach identifying issues and evaluating implications and opinions moving ahead quickly to workable solutions.
2. Adaptive cultures
 - Willingness to accept change and take the challenge to introduce and execute new strategies by all organization members.
 - Sharing a feeling of confidence among company's personnel.
 - Receptive to take risks perform experimentation and innovation as well as willingness to change existing strategies and practices.
 - Supportive work climate.
 - Intrapreneurship (encouraging and rewarding individuals and groups).

It has to be noted that a healthy digital culture is a type of high-performance culture. (Hemerling, Kilmann, Danoesastro, Stutts, & Ahern, 2018, p. 4).

(Cornett, 2018) has identified four common attributes of High-Performance cultures with following characteristics:¹

1. Strong leaders
- #1 Leaders communicate company goals, set the tone and they directly impact employee performance.
 - #2 Leaders lead the execution of goals and play a catalytic role for team performance.
 - #3 Leaders through their behaviors and actions set the bar for performance.
 - #4 Leaders show enthusiasm for achieving challenging goals and show how to overcome obstacles that can hinder the team's performance.

¹ Characteristics of each attribute are numbered for further research application as will be seen in later chapters

#5 Leaders motivate employees and inspire them to do their best in the work they perform.

#6 Leaders create an environment where employees feel committed and inspired.

#7 Leaders set goals and provide feedback.

#8 Leaders communicate clear and measurable goals that are action-oriented.

#9 Leaders communicate empathetically and provide feedback that builds trust, encouraging employees to perform to their best performance.

2. Empowered and engaged employees

#10 Company employees have the ability to make key decisions and hold those decisions, leading to increased commitment.

#11 Company does more than just say it wants to empower employees.

#12 Company ensures that employees have the necessary knowledge and skills in order to be used for good critical thinking when making decisions.

#13 Company provides two-way feedback mechanisms.

#14 Company provides training that promotes the creation of ideas.

#15 Leadership encourages employees to take ownership of their day-to-day roles.

3. A Focus on continuous learning and employee development

#16 Company recognizes that people need to focus on continually improving their skills and knowledge to maintain long-term performance.

#17 Company evaluates the development needs of employees and ensures their continuous development and learning.

#18 Company focuses on employee development by creating a leadership channel.

#19 Company focuses on employee development by creating a solid foundation of capabilities that will power the organization for years of growth.

#20 Leadership development is based on the utilization of the talent and passion of high-potential employees and thus ensures the sustainability of a High-Performance culture.

4. Openness to change

#21 Change is approached by employees as an opportunity and not just as an obstacle to be overcome.

#22 Company is not afraid to rethink its strategy or reinvent jobs, work practices, or other internal processes to achieve results.

#23 Company designs and embraces change and leverages it to drive innovation

#24 If leadership recognizes that there are characteristics in corporate culture that differ from that of a high-performance culture, it then has the ability to develop and execute a plan

that will transform the culture and help employees adapt their behavior to a high-performance culture.

Taking into account the above analytical characteristics of a high-performance culture it can be observed that the characteristics of an adaptive culture are covered by those of a high-performance culture:

#25 The first characteristic of the adaptive culture e.g., the willingness to accept change and take the challenge to introduce and execute new strategies by all organization members is similar to the characteristics of the fourth attribute of a High-Performance culture as described by (Cornett, 2018), namely “Openness to Change”.

#26 The second characteristic of the adaptive culture e.g., Sharing a feeling of confidence among company’s personnel is similar to the characteristics of the second attribute of a high-performance culture as described by (Cornett, 2018) namely “Empowered and Engaged Employees”.

#27 The third characteristic of the adaptive culture e.g., Receptive to take risks perform experimentation and innovation as well as willingness to change existing strategies and practices is similar to the characteristics of the third and fourth attribute of a high-performance culture as described by (Cornett, 2018) namely “A Focus on Continuous Learning and Employee Development” & “Openness to Change” respectively.

#28 The fourth characteristic of the adaptive culture e.g., Supportive work climate is similar to the characteristics of the first attribute of a High-Performance culture as described by (Cornett, 2018) namely “Strong Leaders”.

#29 and finally, the fifth characteristic of the adaptive culture e.g., Intrapreneurship (encouraging and rewarding individuals and groups) is also similar to the characteristics of the first attribute of a high-performance culture as described by (Cornett, 2018) namely “Strong Leaders”.

As a consequence, a healthy digital culture is a type of adaptive high-performance culture.

On the other hand, organizational cultures exist that impede good strategy execution.

Those cultures have a negative impact on the work climate and on the performance of the company due to counterproductive cultural traits. (Thompson, Gamble, Peteraf, & Strickland III, 2018, p. 357) Identifies five particular unhealthy cultural attributes with the following distinctive characteristics:²

1. Change-resistance cultures

² Characteristics of each attribute are numbered for further research application (e.g. survey Questionnaire)

- #30 Fear of change and skepticism about the importance of new development.
- #31 Risk avoidance.
- #32 Capitalization on emerging opportunities.
- #33 Lax approach to both product innovation and continuous improvement in performing value chain activities.
- #34 Response is more slowly than is warranted to market change.
- 2. Politicized cultures
- #35 Political in sighting consume a great deal of organizational energy.
- #36 Political maneuvering hinders of what is best for the company.
- #37 Managers pursue their own agendas and operate the work units under their own supervision autonomously.
- #38 Managers aim to protect or expand their own territory.
- #39 Collaboration with other organizational units is being viewed with suspiciousness.
- #40 Cooperation within and outside the company occurs unwillingly.
- #41 Company actions are influenced from politically influential executives and or coalitions among departments.
- 3. Insular, inwardly focused cultures
- #42 Personnel believe that they have all the answers or can develop them on their own.
- #43 There is a strong tendency to neglect what customers are saying and how their needs and expectations are changing.
- #44 Insular thinking exists within the company.
- #45 Solutions are driven internally.
- #46 Personnel believe that there must be an "invented here mindset"
- #47 Managerial inbreeding exists within the company.
- #48 Company (does not) recruit(s) people who can offer fresh thinking and outside perspectives.
- 4. Unethical and greed driven cultures
- #49 Executives are pursuing overambitious revenue and profitability targets.
- #50 Senior managers wink at unethical behavior.
- #51 Senior managers adopt accounting principles that make financial performance look better than really is.
- 5. Incompatible, clashing subcultures
- #52 Values beliefs and practices differ between departments and directories within the company (subcultures).

#53 Subcultures dominate and impede teamwork among the company's various organizational units.

Taking into consideration the above, organization cultures can be divided into healthy and unhealthy cultures and categorized according to how strong or weak they are.

Obviously, a weak healthy culture or a strong unhealthy culture has to be changed to a healthy one. In order to achieve that, management of the company need to take the necessary actions so that the strategy implemented can be executed successfully (Thompson, Gamble, Peteraf, & Strickland III, 2018, p. 359).

Changing the culture presents a challenge to management and is considered a tough management task due to the anchoring effect of deep-rooted behaviors and attitudes.

Changing a problematic culture can be realized in five steps (Thompson, Gamble, Peteraf, & Strickland III, 2018, S. 358):

1st step: Identify dysfunctional facets of the present culture that impede the execution of a good strategy.

2nd step: new behaviors, actions and work practices have to clearly specify which characteristics for the new culture are.

3rd step: Problems of the present culture need to be communicated openly and provide a persuasive case for the need of culture change.

4th step: Actions need to be visible, forceful, substantive and symbolic in order to establish a deep-rooted effect on the new behaviors, norms and practices.

3 Sample and Methodology

3.1 Proposed Digital Transformation Process (DTP)

Transformation process is perfectly connected with the modification in the way of how a company is doing business. Business modification refers to change and in order to be achieved, company requires an organizational culture change. This is a change of the way employees, leaders and company processes are performing and achieving the everyday business activities. Digital transformation provides a competitive advantage since it reinforces the company's competitiveness on its everyday activities. In order to achieve this advantage, digital transformation has to start from changing company's culture. Cultural change requires first to identify company's current organizational culture. Organization cultures are being categorized into healthy and unhealthy ones. Healthy ones are further categorized into high performance and/or adaptive cultures while unhealthy ones are categorized further into five culture subcategories (Change-resistance, Politicized, Insular, Unethical and incompatible cultures). Since a healthy digital culture is a type of high-performance culture the first target

is to identify if the culture of a company has the characteristics of such a culture and how sustainable they are. In this case actions have to be taken to reinforce any weak identified characteristics and transform the culture's company to a strong-high performance one. On the other hand, if an unhealthy culture is identified then it has to be categorized into one and or more of the five mentioned categories and take action measures to transform firstly the culture into a healthy one. Those measures have then to be reinforced into strong and sustainable ones. This could be achieved by crafting a digital strategy. However, the process is not static but a never-ending and ongoing process in order to be sustainable. Figure 2 below shows schematically the proposed transformation processes. It consists of 4 main steps namely, culture identification, culture categorization, improvement actions towards a strong high performance adaptive culture and finally crafting or changing company's digital strategy.

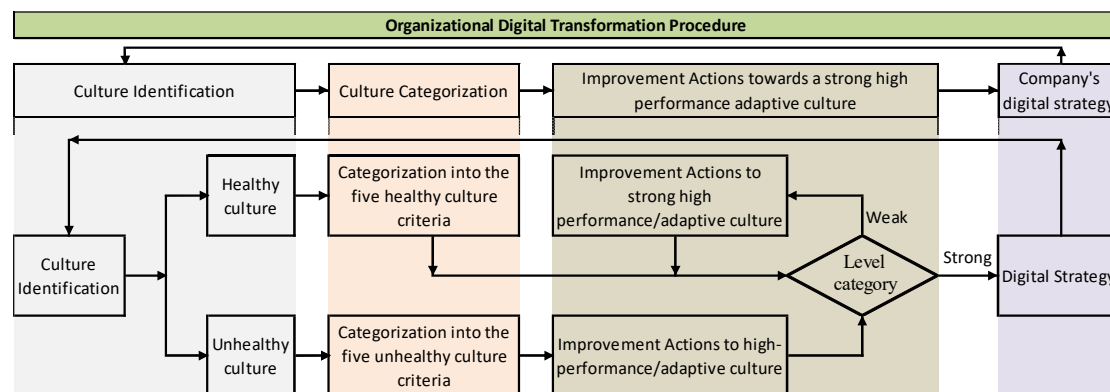


Figure 2 Proposal of Organizational Digital Transformation Process (DTP)

The first step identifies company's culture in terms of two culture categories (healthy and unhealthy), the second step proceeds to a further categorization of above categories in terms of five attributes (criteria) for each category respectively, the third step should provide the necessary improvement actions towards a strong high performance adaptive culture and finally the last step shall adapt company's digital strategy, (Digital Transformation Strategy) respectively. The procedure starts again with the first step which will also provide feedback of the effectiveness of the actions taken towards a strong high-performance culture and the effectiveness of DTS.

3.2 Assessment of a National Defense Company's Organizational Culture (Kapotas, 2021)

In order to identify company's organizational culture and categorize it into a healthy or unhealthy one as well as how strong or weak it is, a questionnaire has been created as shown on

Appendix A. The questionnaire takes all the characteristics identified in the previous

chapters and aims to measure the feeling or view of company employees regarding company's organizational culture. A scale from very low to very high is presented to the questionee where he is asked to classify the specific criteria according to his opinion. In order to statistically analyze the data, the scale is quantified and escalated from 1-10 where:

- 1 and 2 represent a very low effect of the distinctive characteristic or attribute.
- 3 and 4 represent a low effect of the distinctive characteristic or attribute.
- 5 and 6 represent a middle effect of the distinctive characteristic or attribute.
- 7 and 8 represent a high effect of the distinctive characteristic or attribute.
- 9 and 10 represent a very high effect of the distinctive characteristic or attribute.

It has to be noted that the first 29 questions are distinctive characteristics for a healthy culture and represent positive questions while the rest 30-53 represent distinctive characteristics for an unhealthy culture and are negative questions. The latter questions have been reverted in order to provide a positive attitude to the questionee while performing the survey and to reduce any misunderstanding, in a scale that differs in direction.

When a questionnaire is answered the average of each criterion is calculated representing the mean for each attribute (criterion). For the answers of questions 30-53 the average calculated is subtracted from 10 since those questions have been reverted as discussed above. Furthermore, a total average for a healthy and unhealthy culture is calculated representing the mean for each of the two categories respectively. The population of the company is ~1450 personnel. Since the population number is large and submitting or interviewing all of them will require a big amount of time and analysis the optimal sample size was calculated as follows:

An initial sample of 80 questionnaires was sent and within one month 25 employees responded either directly or with the form of an interview. The response rate was thus appr. 30%. The results regarding the mean and the standard deviation of the above 25 samples are calculated for the healthy and unhealthy category as an average of the distinctive characteristics respectively.

Since the sample size is not known the t distribution with the appropriate degrees of freedom cannot be selected so the use of standard normal distribution has been selected. For a 95% confidence interval $z_{crit} = 1,96$. Since the questionnaire scale is changing from very low to very high, every 1 increment, a deviation of sample mean \bar{X} from population μ ($\bar{X}-\mu$) of less than 0.5 would be considered appropriate for the evaluation. Hence the optimal sample size is determined as follows (Kavoussanos, 2005, pp. 153-155) using σ as the sample standard deviation S:

$$n = \left(\frac{z_{crit}\sigma}{\mu - \bar{X}} \right)^2 \quad 3.2-1$$

The number of questionnaires to be sent is then calculated as:

$$n_{sent} = n/0.3 \quad 3.2-2$$

where 0.3 the response rate (30%).

Table 1 below, show the results (statistic measures) for each of the attributes of the healthy and unhealthy culture category namely the sample mean " \bar{X} ", standard deviation " S ", optimal sample size " n " and number of questionnaires to be sent " n_{sent} ". It can be identified that the optimal sample size is 72, representing the maximum number of line-item n while the number of questionnaires to be sent taking into account the response rate should be 242. A total number of 300 questionnaires have been sent per email.

Statistic measures	Strong leaders (Questions 1-9)	Empowered and Engaged Employees (Questions 10-15)	Focus on Continuous Learning & Employee Development (Questions 16-20)	Openness to Change (Questions 21-24)	Adaptive (Questions 25-29)	Average Healthy Culture	Change-Resistance Cultures (Questions 1-5 (30-34))	Politicized Cultures (Questions 6-12 (35-41))	Insular, Inwardly Focused Cultures (Questions 13-19 (42-48))	Unethical and Greed-Driven Cultures (Questions 20-22 (49-51))	Incompatible, Clashing Subcultures (Questions 23-24 (52-53))	Average Unhealthy Culture
\bar{X}	4.2	4.4	4.0	3.7	3.9	3.7	6.6	6.2	5.7	5.2	5.4	5.9
S	2.2	1.9	1.9	1.8	2.0	1.8	2.1	1.8	1.7	2.2	2.0	1.7
n	72	53	56	52	63	49	71	52	44	72	63	45
n_{sent}	242	176	185	174	211	164	236	174	148	241	209	150

Table 1 Determination of optimal sample size & number of questionnaires sent

A total of 85 employees have answered the questionnaire either by sending it electronically via email or hardcopy in a short explanatory interview. This number is considered as being statistically acceptable based on above optimal sample size calculation. Following the above, statistical analysis was based on a sample size of $n = 85$, and population size of $N = 1450$. Using the t distribution with a confidence interval of 95% population mean μ was determined for each category (healthy and unhealthy culture) as well as for each of their characteristics respectively, identifying them in a scale from low to high.

Calculation was based with t statistic due to unknown population standard deviation σ as follows (Michiotis, 2005, p. 145):

$$\mu = \bar{X} \pm t_{\frac{\alpha}{2}(n-1)}^{crit} \frac{S}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}} \quad \text{for } n \geq 0.05N^3 \quad 3.2-3$$

4 Results

The following tables, show the statistics for each of distinctive characteristic (questions q^m), distributed in the scale 1-10 (low to high) where $m = 1$ to 53 and for each attribute “a” and Category “C”. Table 2, Table 3 & Table 4 below show for each distinctive characteristic q^m , of attribute “a” and category “C” (here C = Healthy organizational culture) how the calculated mean value μ : (μ_{q^m} , μ_a and μ_C) respectively, is varied with 5% significance or 95% confidence interval ($\mu_{\min} \leq \mu \leq \mu_{\max}$). As a consequence, with a 5% significance (95% confidence), the company’s employees’ feelings of how the healthy category of company’s organizational culture is being viewed is **Low**.

The average of each of the 5 attributes “a” of the healthy culture is also viewed as **Low** with 5% significance (95% confidence).

Category C	HEALTHY ORGANIZATIONAL CULTURE														
Attribute a	Strong Leaders									Empowered and Engaged Employees					
q^m	q^1	q^2	q^3	q^4	q^5	q^6	q^7	q^8	q^9	q^{10}	q^{11}	q^{12}	q^{13}	q^{14}	q^{15}
\bar{x}_{q^m}	4,1	4,2	4,0	3,8	3,6	3,2	3,9	3,8	3,4	4,1	3,1	4,7	4,0	4,1	4,3
S_{q^m}	2,2	2,1	2,2	1,9	2,0	2,0	2,1	2,1	2,1	2,0	1,9	2,3	2,2	2,1	2,1
$\mu_{q^m\min}$	3,6	3,7	3,6	3,4	3,1	2,8	3,4	3,3	2,9	3,7	2,7	4,3	3,5	3,7	3,9
$\mu_{q^m\max}$	4,5	4,6	4,5	4,2	4,0	3,6	4,3	4,2	3,9	4,5	3,5	5,2	4,4	4,6	4,8
$\mu_{q^m\min}$	Low	Low	Low	Low	Low	Very low	Low	Low	Very low	Low	Very low	Low	Low	Low	Low
$\mu_{q^m\max}$	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Middle	Low	Low	Low
\bar{x}_a	3,8									4,1					
S_a	1,9									1,8					
$\mu_{a\min}$	3,4									3,7					
$\mu_{a\max}$	4,2									4,4					
$\mu_{a\min}$	Low									Low					
$\mu_{a\max}$	Low									Low					

Table 2 Statistics of Company’s organizational culture Category “C” = Healthy and attributes “a”= Strong Leaders, Empowered and Engaged Employees

³ Consider that $n = 85 \geq 0.05N = 72$, Student $t_{\frac{\alpha}{2}(n-1)}^{crit} = 1,989$ associated with a two-tail test as from table in (Michiotis, 2005, S. 261) with probability $p = 5\%$ and $v = n-1 = 84$

Category C	HEALTHY ORGANIZATIONAL CULTURE													
Attribute a	Continuous Learning and Development					Openness to Change				Adaptive				
q^m	q^{16}	q^{17}	q^{18}	q^{19}	q^{20}	q^{21}	q^{22}	q^{23}	q^{24}	q^{25}	q^{26}	q^{27}	q^{28}	q^{29}
$\bar{x}q^m$	4,4	3,9	3,2	3,3	3,3	3,8	3,7	3,2	3,3	4,0	3,2	3,7	3,9	2,9
Sq^m	2,2	2,1	1,8	1,9	2,0	1,9	2,1	1,9	1,9	2,1	2,0	1,9	2,1	1,8
μq^m_{min}	3,9	3,5	2,8	2,9	2,9	3,4	3,3	2,8	2,9	3,6	2,8	3,3	3,5	2,5
μq^m_{max}	4,8	4,4	3,6	3,7	3,7	4,2	4,1	3,6	3,7	4,5	3,6	4,1	4,3	3,2
μq^m_{min}	Low	Low	Very low	Very low	Very low	Low	Low	Very low	Very low	Low	Very low	Low	Low	Very low
μq^m_{max}	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
$\bar{x}a$	3,6					3,5				3,5				
Sa	1,7					1,7				1,7				
μa_{min}	3,2					3,1				3,2				
μa_{max}	4,0					3,8				3,9				
μa_{min}	Low					Low				Low				
μa_{max}	Low					Low				Low				

Table 3 Statistics of Company's organizational culture Category "C" = Healthy and attributes "a"= Continuous Learning and Development, Openness to Change, Adaptive

$\bar{x}C$	3,72
SC	1,63
μC_{min}	3,38
μC_{max}	4,07
μC_{min}	Low
μC_{max}	Low

Table 4 Statistics of Company's organizational culture Category "C" = Healthy

In a same manner Table 5, Table 6 and Table 7 below show for each distinctive characteristic q^m , of attribute "a" and category "C" (here C = Unhealthy organizational culture) how the calculated mean value μ : (μq^m , μa and μC) respectively, is varied with 5% significance or 95% confidence interval ($\mu_{min} \leq \mu \leq \mu_{max}$).

As a consequence, with 5% significance (95% confidence), the company's employees' feelings of how the unhealthy category of company's organizational culture is being viewed is **middle**. The average of each of the 5 attributes "a" of the unhealthy culture is also viewed as **middle** to **high** with 5% significance (95% confidence).

Category C	UNHEALTHY ORGANIZATIONAL CULTURE											
Attribute c	Change Resistance					Politicized						
q^m	q^{30}	q^{31}	q^{32}	q^{33}	q^{34}	q^{35}	q^{36}	q^{37}	q^{38}	q^{39}	q^{40}	q^{41}
μq^m	6,6	6,4	7,0	6,7	7,4	7,5	7,7	5,8	6,3	6,1	5,8	6,7
Sq^m	2,0	2,4	1,9	1,9	1,9	2,3	1,4	2,0	2,0	1,9	1,9	2,2
μq^{mmin}	6,2	6,0	6,7	6,3	7,0	7,0	7,4	5,4	5,9	5,7	5,4	6,2
μq^{mmax}	7,1	6,9	7,4	7,1	7,8	7,9	8,0	6,3	6,7	6,5	6,2	7,2
μq^{mmin}	Middle	Middle	Middle	Middle	Middle	Middle	High	Middle	Middle	Middle	Middle	Middle
μq^{mmax}	High	Middle	High	High	High	High	High	Middle	Middle	Middle	Middle	High
μa	6,8					6,6						
Sa	1,7					1,5						
μa_{min}	6,5					6,2						
μa_{max}	7,2					6,9						
μa_{min}	Middle					Middle						
μa_{max}	High					High						

Table 5 Statistics of Company's organizational culture Category "C" = Unhealthy and attributes "a"= Change Resistance, Politicized

Category C	UNHEALTHY ORGANIZATIONAL CULTURE											
Attribute a	Insular Inwardly							Unethical Greed driven			Sub- Cultures Clashing Subcultures	
q^m	q^{42}	q^{43}	q^{44}	q^{45}	q^{46}	q^{47}	q^{48}	q^{49}	q^{50}	q^{51}	q^{52}	q^{53}
μq^m	5,4	4,5	5,9	5,8	6,1	7,0	6,9	6,1	5,7	5,5	5,9	6,2
Sq^m	1,9	2,2	2,0	1,8	2,1	2,3	1,8	2,1	2,2	2,2	1,9	2,0
μq^{mmin}	5,0	4,0	5,5	5,5	5,6	6,5	6,6	5,7	5,2	5,1	5,6	5,8
μq^{mmax}	5,8	5,0	6,3	6,2	6,5	7,4	7,3	6,5	6,2	6,0	6,3	6,6
μq^{mmin}	Middle	Low	Middle	Middle	Middle	Middle	Middle	Middle	Middle	Middle	Middle	Middle
μq^{mmax}	Middle	Low	Middle	Middle	Middle	High	High	Middle	Middle	Middle	Middle	Middle
μa	5,9							5,8			6,1	
Sa	1,5							2,0			1,8	
μa_{min}	5,6							5,4			5,7	
μa_{max}	6,3							6,2			6,5	
μa_{min}	Middle							Middle			Middle	
μa_{max}	High							High			High	

Table 6 Statistics of Company's organizational culture Category "C" = Unhealthy and attributes "a"= Insular Inwardly, Unethical Greed driven, Sub- Cultures Clashing Subcultures

\bar{x}_C	6,30
SC	1,43
μ_{Cmin}	6,0
μ_{Cmax}	6,6
μ_{Cmin}	Middle
μ_{Cmax}	Middle

Table 7 Statistics of Company's organizational culture Category "C" = Unhealthy
Company assessment of **organizational healthy culture** has shown that organization needs to strengthen the following characteristic of each attribute:

Strong leaders

Communicate the company goals up to employee level, lead the execution of those goals have a positive behavior and show enthusiasm of achieving them. Motivate and inspire the employees helping them to overcome any obstacles, provide feedback and create an environment in which the employees feel inspired and committed.

Specifically, statistics show that distinctive characteristics #6 (*Leaders create an environment where employees feel committed and inspired*) and #9 (*Leaders communicate empathetically and provide feedback that builds trust, encouraging employees to perform to their best performance*), have the lowest mean than others.

As a consequence, company leaders have to increase their effort on creating an environment where employees feel committed and inspired, learn how to communicate empathetically and provide feedback in order to build trust and encourage employees to perform to their best performance.

Empowered and Engaged Employees

Company employees should be able to make key decisions and hold those decisions, leading to increased commitment. They should be able to take ownership of their day-to-day roles. Company should do more than just saying that it wants to empower employees and give the necessary knowledge and skills to them in the field of good critical thinking and creation of ideas. A two-way feedback mechanism should also be available.

Specifically, statistics show that distinctive characteristic #11 (*Company does more than just say it wants to empower employees*), has the lowest mean than others. It seems that employees are seeking reward and recognition from the organization. The company has to increase the effort on rewarding and recognizing employees' efforts, train them in areas such as customer service, problem solving, and negotiation and conflict resolution skills.

Focus on Continuous Learning and Employee Development

Company should focus on continually improving employees' skills and knowledge, evaluate

their development needs and ensure their continuous development and learning. Employees with high potential, talent and passion, should be utilized for leadership development. Specifically, statistics show that distinctive characteristics #18 (*Company focuses on employee development by creating a leadership channel*), #19 (*Company focuses on employee development by creating a solid foundation of capabilities that will power the organization for years of growth*) and #20 (*Leadership development is based on the utilization of the talent and passion of high-potential employees and thus ensures the sustainability of a High-Performance culture*), have the lowest mean than others. As a consequence, the company has to create a more systematic, visible system of identifying candidates for promotion and combine this promotion with the processes for their development. The company has to focus on employees' long-term development and their training. Leaders have to develop skills so as to encourage and promote high-potential employees in order to cultivate a high-performance culture.

Openness to Change

Change should be approached by the company as an opportunity and should rethink its strategy or reinvent jobs, work practices, or other internal processes to achieve results. Company should drive innovation and any characteristic which differ from a high-performance culture, identify the setback, develop and execute a plan to transform the culture and help employees adapt their behavior to a high-performance culture. Specifically, statistics show that distinctive characteristics #23 (*Company designs and embraces change and leverages it to drive innovation*) and #24 (*If leadership recognizes that there are characteristics in corporate culture that differ from that of a high-performance culture, it then has the ability to develop and execute a plan that will transform the culture and help employees adapt their behavior to a high-performance culture*), have the lowest mean than others. The company has to increase the effort to plan and promote change and strive for innovation and when it recognizes that there are characteristics in corporate culture that differ from that of a high-performance culture, it should have the ability to develop and execute a plan that will transform the culture and help employees adapt their behavior to a high-performance culture.

On the other hand, identified **unhealthy culture attributes** have to be diminished especially those which do not have an opposite characteristic on the healthy criteria. For example, actions taken to improve the openness to change characteristic of healthy culture will have as a consequence an elimination effect on the change-resistance unhealthy culture criteria. Also, a plan for increasing and maintaining all the characteristics of a healthy culture will have a

diminishing effect on the negative unhealthy characteristics. Generally, company should be focusing on diminishing the following characteristics of an unhealthy culture:

Politicized Cultures

Political interventions should be kept away from organizational decisions. Managers should be focused on **Company Goals** and communicate those with the positive behavior and enthusiasm to employees. Collaboration with other organizational units should be reinforced avoiding any silo effect. Cooperation within and outside the company should be increased. Specifically, statistics show that distinctive characteristics #35 (*Political in sighting consume a great deal of organizational energy*) #36 (*Political maneuvering hinders of what is best for the company*) and #41 (*Company actions are influenced from politically influential executives and or coalitions among departments*) have the highest mean than others. It appears that a high amount of organizational energy is consumed by political influences and interventions which do not allow the best for the company and corporate culture and company has to increase the efforts of blocking those negative influences.

Insular, Inwardly Focused Cultures

Customer opinion should be considered by all levels in the organizational culture and communicated properly. Solutions should be driven not only internally but also externally. Company should recruit people who can offer fresh thinking and outside perspectives. Specifically, statistics show that distinctive characteristics #47 (*Managerial inbreeding exists within the company*) and #48 (*Company recruits' people who can offer fresh thinking and outside perspectives*) have the highest mean than others. The company has to think outwards and consider of recruiting managers outside the company not only reproducing them from within. It has to be noted that distinctive characteristic #43 (*there is a strong tendency to neglect what customers are saying and how their needs and expectations are changing*) has the lowest mean than others. This is a positive sign since it shows that the company has a tendency to listen customer's voice and consider their changes in needs and expectations.

Unethical and Greed driven Cultures

Targets such as revenue and profitability should be achievable and not overambitious. Improving targets not in a proper manner should be eliminated and achieved as described in the healthy culture attributes.

Incompatible, Clashing Subcultures

Values beliefs and practices should be uniform between departments and directories within the company and any form of subculture that differ, should be eliminated specifically at their beginning and before taking roots, making the elimination hard to achieve.

In order for the digitalization process to be sustainable it has to be considered as a never-ending and ongoing process. As a consequence, the company culture identification is not a one-time action but it has to be re-identified and evaluated. A periodic evaluation implemented into the digital strategy will provide feedback of the effectiveness of the actions towards the high-performance adaptive culture.

The “Radar Charts” shown in Figure 3 provide a useful tool which visualizes the concept. The application of those radar charts provides a control of improvement in terms of quality, by displaying the performance metrics of the company’s culture. When company’s culture has been identified, healthy culture can be expanded by taking actions on improving each distinctive healthy culture characteristic which in turn will improve the corresponding healthy attribute respectively and total healthy culture category.

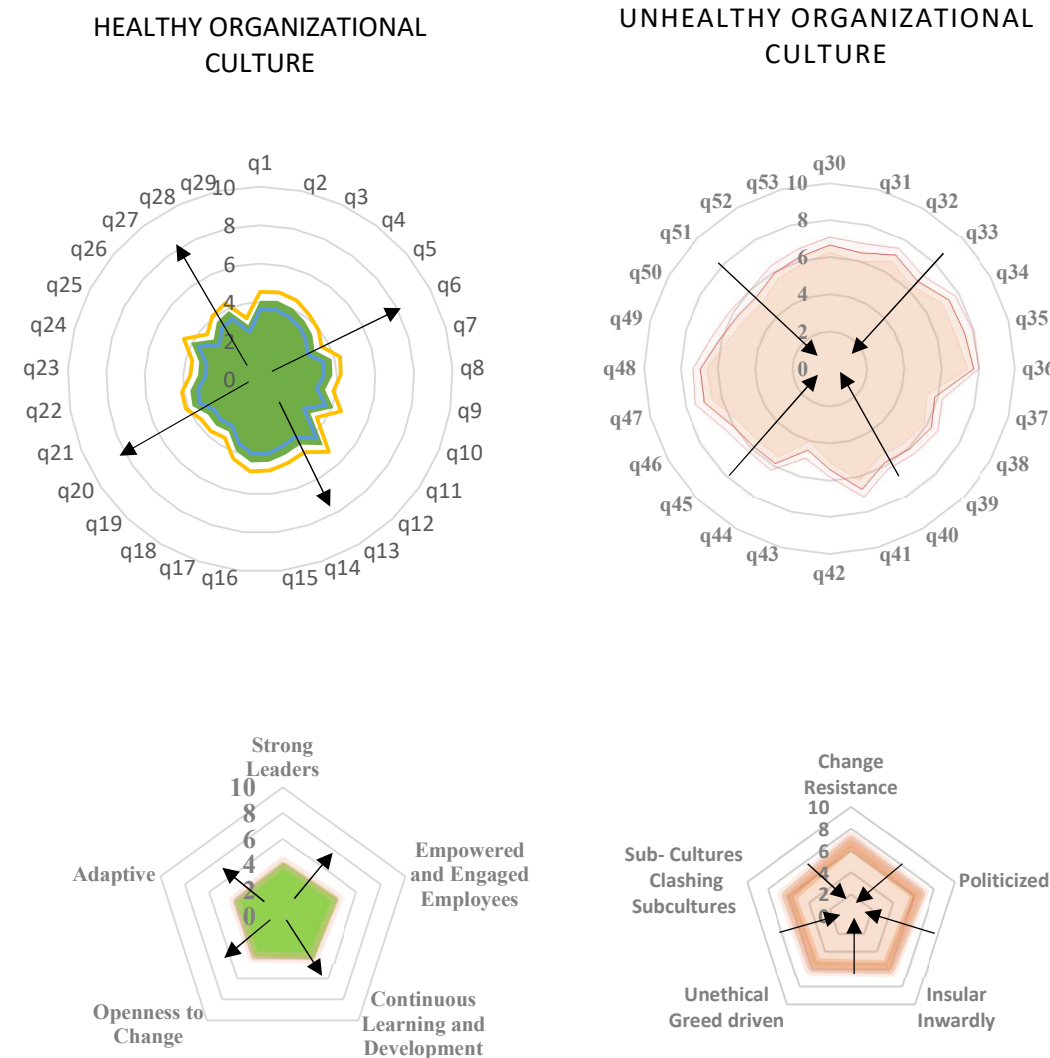


Figure 3 Radar charts of expansion and shrinkage of company’s healthy and unhealthy organizational culture respectively.

In contrary, unhealthy culture shall be diminished by eliminating each distinctive unhealthy culture characteristic which in turn will eliminate the corresponding unhealthy attributes respectively and total unhealthy culture category. Figure 3 shows visually the expected expansion of the healthy and the shrinkage of the unhealthy culture respectively, which the company has to aim and evaluate constantly.

It is recommended for the company to focus on expanding the 5 attributes of the healthy and shrinking those of the unhealthy culture and the corresponding distinctive characteristics (questions) respectively. Visually, the 5 sides of the pentagon formed from the 5 attributes of each category should move outwards in the healthy and inwards in the unhealthy culture as shown in the radar charts.

4.1 National Defense Company's vision and mission statement proposal

Three of the most critical tasks in strategy formulation are vision and mission settings, objectives and strategy development (Michiotis, 2005, p. 33).

Company's Vision statement proposal

It is important in any organization that managers and executives agree upon the basic vision that a firm aims in the long term. (Thompson, Gamble, Peteraf, & Strickland III, 2018, p. 21). A vision statement should answer the basic question "Where we want to go?" or the equivalent question "What business do we want to become?" (Michiotis, 2005, p. 35). A strategic vision shapes organizational identity, creates commitment to future actions points on organization in a particular direction and charts a strategic path for it to follow.

A clearly structured strategic vision communicates the aspiration of the management to the stakeholders (employees, customers, suppliers, shareholders etc.) and helps direct company's personnel actions in a common direction. (Thompson, Gamble, Peteraf, & Strickland III, 2018, p. 21).

The statement:

<Company name>, a national organization providing high quality products and services, a pioneer of digital transforming the way it does its business,

is a proposed example of a strategic vision statement for the company which communicates the high quality of product and services it provides and should maintain, and the particular direction it should be heading, namely to stand among the first national companies of its kind (nationally and internationally) being transformed digitally.

Company's Mission statement proposal

Strategic vision does not provide a description of the present business and its purpose. Vision

has an aspirational characteristic and describes company's future strategic course. (Thompson, Gamble, Peteraf, & Strickland III, 2018, p. 24).

What an organization does and whom it wants to serve reveals company's mission statement. It sets the baseline for any strategies, plans and work assignments and is the principle for the design of managerial structures and jobs (Michiotis, 2005, p. 37).

The statement:

<Company name>, committed to its national and international customers in the <company main activity> industry, intends to digitally transform its maintenance, manufacturing, development activities and management systems in order to provide to its customers a unique digital customer experience, in a timely and cost-effective manner with high-quality products and services giving priority to health and safety of its employees and their satisfaction, while protecting the environment and maintaining company's financial sustainability,

is a proposed example of a mission statement for the company showing which the customers are and where (national and international of company's main activity) for what products and services (manufacturing maintenance and development), with what philosophy (digitally transforming the organization activities and its management systems) maintaining its competitive advantage by delivering high quality products and services with satisfied stakeholders (employees, customers, stockholders) as well as values such as health, safety and environment.

5 Conclusions

Digital transformation is an ambitious task and to perform this task the organization will have to allocate significant financial and human resources. The enthusiasm at the beginning should be integrated into the whole organization in order for the majority of the employees to understand the change needed and get the necessary support for digital transformation (Mirković, Lukić, Lazarević, & Vojinović, 2019, p. 259).

As described in §2.1 when digital transformation is implemented, organization changes the way it does its business, organizational results are improved and a productivity increase is initiated. With less effort the same goals can be achieved and with same effort better results can be achieved. This will lead to increased profits. In addition, organization becomes more flexible, customer insights and experience are improved and digital culture via an improved collaboration is enhanced.

However, company has to overcome common barriers to reap above benefits. As described in §2.2 an unclear vision and objective, lack of leadership skills, lack of knowledge and

experience, lack of rewards and incentives which are not aligned with the DTS, lack of management understanding, an unclear measurement and rewarding system, lack of engagement and involvement of employees and resistance to change are the common barriers to digital transformation. Organization structure has to become more flexible, agile responsive, open and innovative. A key challenge for leaders and managers! (Mirković, Lukić, Lazarević, & Vojinović, 2019, p. 259). Processes and operations are going to change and entirely new solutions will emerge. People engagement has to be maintained and adjusted continuously. Digital transformation is an ongoing process and it is difficult to predict what effect the changes will have on the operations throughout the organization. The target is to maintain a strong high performance and adaptive culture. Current company culture identification and changing DTS towards high performance and adaptive culture are vital in order to understand and how to overcome any difficulties the operations are experiencing during the digital transformation.

4.1 Theoretical Contribution

The current research addresses the question of how an organization can be transformed digitally and tries to define a process towards the digitalization of the organization. The focus is on organizational culture change. A healthy culture with strong leaders, empowered and engaged employees, a focus on continuous learning, on employee development and openness to change is considered as the prerequisite for an organization to be transformed digitally. Since digitalization is a never-ending and ongoing process, vision, mission statements and organizational strategy have to be aligned with the process of digitalization. A useful “channel” for the strategic management to achieve this process is through Quality Management.

4.2 Practical Contribution

Many organizations are trying hard, making their best in order to transform their organization digitally. (Fitzgerald, Kruschwitz, Bonnet, & Welc, 2014) as cited in (Schwarzmüller, Brosi, Duman, & Welp, p. 132). The relationships mentioned above may prove valuable, increasing awareness for the central changes following from a digital transformation. Personnel selection functions can ensure that new recruits have the necessary skills to thrive in the digital age, (Cascio & Aguinis, 2008) as cited in (Schwarzmüller, Brosi, Duman, & Welp, p. 133). Despite increased availability and job demands, special focus should lie on resilience, a trait that will help to exhibit high performance (Youssef & Luthans, 2007) as cited in (Schwarzmüller, Brosi, Duman, & Welp, p. 133). In parallel focus should also lie on problem-solving skills, creativity, agility, willingness to learn and the readiness to take over responsibility. When recruiting

leaders, organizations should search for persons, willing to empower employees and to display relationship-orientation. Organizations may also use the above results to adjust personnel development (Day, Fleenor, Atwater, Sturm, & McKee, 2014) as cited in (Schwarz Müller, Brosi, Duman, & Welppe, p. 133). Teaching employees how to efficiently work in virtual, self-organizing or cross organizational teams seems worthwhile. Leaders on the other hand should be taught how to empower employees without overburdening them. In addition, they should be trained in health management. "Finally, organizational culture should be transformed to a culture of involvement in which decisions are taken together, a culture of innovation, that ensures agility based on the acceptance of suggestions, and a culture of training, in which staff is constantly developed" (Patterson, et al., 2005) as cited in (Schwarz Müller, Brosi, Duman, & Welppe, p. 133).

Current assessment has identified tools which could be used for company's culture identification (Questionnaire) and measurement (potential). Those can be used from HR function anonymously and discrete and provide the drivers for actions throughout various organization's activities towards a high-performance adaptive culture.

Implementing and monitoring the necessary actions for DTS can be provided by QM function. QM will coordinate and apply the stages of the road map shown namely planning, conducting, evaluation and adjustment of digital transformation. Involvement of IT function to provide the necessary IT tools for the transformation process is considered vital.

As a consequence, the **primary key functions** necessary to be involved, for an organization that intends to be transformed digitally and implement a DTP (Digital Transformation Procedure) are HR (Human Resources), IT (Information Technology) and QM (Quality Management).

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Appendix A “Survey Questionnaire”

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